Using unmanned aerial systems for the monitoring of Belgium forests:
discrimination of tree species based on time series of airborne images

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BEODays 2013, 20 november 2013
Introduction

Measurement of the vegetation height

Discrimination of tree species
Using unmanned aerial systems for the monitoring of Belgium forests

Introduction
Measurement of the vegetation height
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Introduction

Measurement of the vegetation height

Discrimination of tree species

Decision-making tool

Alert: you are harvesting more than the productivity

GROWTH: 9 m³/ha.an
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Introduction

Measurement of the vegetation height

Discrimination of tree species

What is the added value in comparison to others remote sensing platforms?

▶ The spatial resolution: unmanned aircrafts fly at low-altitude, cover relatively small area but result in a very high resolution.

▶ The temporal resolution: UAS deployment is quick and operational costs are low. Revisit period can fit ecological phenomena.
Using unmanned aerial systems for the monitoring of Belgium forests

Introduction

Measurement of the vegetation height

Discrimination of tree species
Using unmanned aerial systems for the monitoring of Belgium forests

Introduction

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Discrimination of tree species
Using unmanned aerial systems for the monitoring of Belgium forests

Introduction
Measurement of the vegetation height
Discrimination of tree species

courtesy: Julien Michot
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**Introduction**

Measurement of the vegetation height

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**Canopy height model**

- **DSM (Digital Surface Model)**
- **DTM (Digital Terrain Model)**
- **Canopy Height Model:**
  \[ \text{CHM} = \text{DSM} - \text{DTM} \]
Low-oblique vantage images require true orthorectification in forested area.
Using unmanned aerial systems for the monitoring of Belgium forests

Introduction
Measurement of the vegetation height
Discrimination of tree species

True orthorectification

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Using unmanned aerial systems for the monitoring of Belgium forests

Introduction

Measurement of the vegetation height

Discrimination of tree species

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Using unmanned aerial systems for the monitoring of Belgium forests

Introduction
Measurement of the vegetation height
Discrimination of tree species

Goal: identifying species based on their phenology through the use of UAS imagery. Defining which orthophotos are the more essential for species discrimination (time windows, metrics).

- 24 flights during 3 seasons (spring, summer and autumn)
- flight altitude from 150 to 350 meters
- from spring 2011 to autumn 2013
- a total of 12700 images
Pipeline:

1. Images acquisition
2. Processing Images block and co-registration
3. Delineate tree crowns (photo-interpretation) of known species (field inventory)
4. Compute metrics for each tree crown from time series
5. Classify tree crowns
Pipeline:

1. Images acquisition
2. Processing Images block and co-registration
3. Delineate tree crowns (photo-interpretation) of known species (field inventory) **IN PROGRESS**
4. Compute metrics for each tree crown from time series **IN PROGRESS**
5. Classify tree crowns **IN PROGRESS**
Using unmanned aerial systems for the monitoring of Belgium forests

**Introduction**

**Measurement of the vegetation height**

**Discrimination of tree species**

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**Modified Camera**

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**courtesy: Rogier de Jong**

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![Graph showing spectral sensitivity and wavelength efficiency for different camera filters.](image)
Using unmanned aerial systems for the monitoring of Belgium forests

Introduction

Measurement of the vegetation height

Discrimination of tree species

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Using unmanned aerial systems for the monitoring of Belgium forests

Introduction

Measurement of the vegetation height

Discrimination of tree species
Using unmanned aerial systems for the monitoring of Belgium forests

**Introduction**

**Measurement of the vegetation height**

**Discrimination of tree species**

Time series of Grand-Leez

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Using unmanned aerial systems for the monitoring of Belgium forests

Introduction
Measurement of the vegetation height
Discrimination of tree species

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Introduction
Measurement of the vegetation height
Discrimination of tree species

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